



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
SURVEILLANCE AND ANALYSIS DIVISION
REGION VII
25 FUNSTON ROAD
KANSAS CITY, KANSAS 66115

March 19, 1981

Mr. Kenneth E. Biglane (WH-548)
Acting Director
Hazardous Response Support Division
U.S. Environmental Protection Agency
401 M Street, S.W.
Washington, D.C. 20460

Dear Mr. Biglane:

The subject of this letter is the Regional Response Team review of control of mine tailings discharges to the Big River in the vicinity of Desloge, Missouri.

The mine tailings which are of interest came from a mill located on the outskirts of Deslodge in St. Francois County, Missouri. Mine tailings were stockpiled in the area near Deslodge over a 30-year period from about 1929 to 1958. These tailings were transported from a nearby smelter by slurry pipeline to the site.

In 1972, this 500 acre site was donated by St. Joe Minerals Corporation to the St. Francois County Environmental Corporation, a not for profit body, for use as a sanitary landfill. This conversion also resulted in a shift of maintenance from St. Joe Minerals to the landfill corporation. Landfill operations were begun in 1973.

In 1977, a section of the tailings pile washed into the Big River. Although the exact quantity of material which washed into the river is not known, estimates suggest this quantity could have been as large as 50,000 cubic yards. Physical evidence suggests that much of the erosion which has taken place at this location occurred in a single event.

Erosion continues at this site and although the current level of discharge is small, the potential exists for significant quantities of additional material to move into the Big River.

Both the U.S. Department of Interior and the Environmental Protection Agency have submitted this waste site as an example of a serious continuing pollution problem in support of Superfund legislation, and in hopes of ultimately obtaining the correction of the lead mine tailings problems. Fish (sucker family) in the Big River immediately below the mine tailings

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Superfund

have lead concentrations (0.5 ppm) that are higher than the level (0.3 ppm) the World Health Organization has set as the maximum safe lead level in food for adults. The Missouri Department of Conservation and the Missouri Division of Health stated in a news release this summer that "people should be discouraged from eating large quantities of suckers from the Big River in Missouri's lead mining belt."

The Department of Interior Regional Response Team representative for this area informally requested an opportunity to sit down and discuss the current activities in regard to this site with the principals involved. Mr. Kesel stated the Department of Interior believes the problem is serious enough to be considered as a project under the recently passed Superfund bill.

On March 9, 1981, a meeting was held in the area offices of the Fish and Wildlife Service in Kansas City to review current status of the problems and steps toward a satisfactory solution. Dr. James Whitley, Missouri Conservation Commission, reported that several state agencies have acted in concert to get a commitment from St. Joe Minerals to provide significant remedial action at this site in the near future. Specific details of the commitment or the timing for remedial measures are not yet available. It was the consensus of the meeting participants that no actions should be taken now, which would inhibit completion and implementation of an agreement with St. Joe Minerals to take significant remedial actions in the near future. It was also discussed that the adequacy of the remedial actions was subject to review and possibly additional requests for remedial actions by the Regional Response Team at some future date. The group was requested to reconvene in the same location at 10:00 a.m. on May 18, 1981 to receive an update from the State of Missouri personnel on progress to date. No request for a formal Regional Response Team meeting has been made by either the Department of the Interior or the Environmental Protection Agency, and further actions will pend a review of progress on May 18. Other Regional Response Team members with potential direct interests in this site are welcome to attend the planned May 18 meeting.

Sincerely yours,


William J. Ketfer
Chairman - Regional Response Team

Attachment

DISTRIBUTION LIST:

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UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

DATE: July 17, 1981

SUBJECT: Update on Desloge, Lead Mine Tailings Situation

FROM: Robert L. Morby, Chief
Hazardous Materials Branch

TO: David A. Wagoner
Director, Air and Hazardous Materials Branch

Kerry Herndon called Dick Rankin of Missouri Department of Natural Resources (MDNR) today for an update on the lead mine tailings in Desloge. A summary of that conversation follows.

Missouri Department of Natural Resources and St. Joseph Mineral Company met during April. At the meeting, St. Joseph Mineral agreed to provide a remedial action plan to MDNR for approval, but at the same time asked to be released from liability for any problems at the tailings sites. MDNR was not willing to make that agreement, but another meeting was arranged.

Missouri Department of Natural Resources and St. Joseph Mineral met again in June. St. Joseph Mineral had a remedial action plan in-hand and ready to present to MDNR if that agency would release them from all liability. MDNR refused and, at the point, negotiation and communication broke down.

Late in June, MDNR sent a letter to St. Joseph Minerals outlining the terms which the state felt it could not negotiate. To date, there has been no response by St. Joseph Mineral.

Primary responsibility for the project negotiations have shifted to Robert Schreiber. Mr. Rankin encouraged us to contact Mr. Schreiber for further updates.

Dave:

This an update on our involvement in Desloge site.

Bob

SITE:	BIG RIVER MINE
ID#:	MD0981126899
BREAK:	1.1
OTHER:	AR

sent 7/21
CC
1 WALKER
JACOBS
RICE
send back
to Morby
Jim Felt
Katie
Kerry
File

40275675



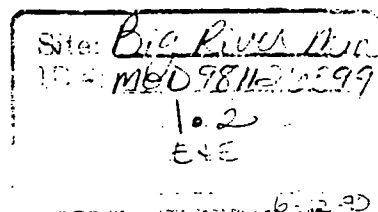
Superfund



ecology and environment, inc.

CLOVERLEAF BUILDING 3, 6405 METCALF, OVERLAND PARK, KANSAS 66202, TEL. 913/432-9961

International Specialists in the Environment



MEMORANDUM

TO: Pete Culver, RPO

THRU: Sharon Martin, AFITOM *SPM*

FROM: E & E/FIT

DATE: June 12, 1990 *M.D. 981126X19*

SUBJECT: Work Plan for the Listing Site Inspection of the Big River
Mine Tailings site, Desloge, Missouri.
TDD #F-07-9004-011 PAN #FM00616XA
Site #Y60 Project #003
Superfund Contact: Greg Reesor
FIT Project Leader: Steven Vaughn

RECEIVED
JUN 18 1990
PREP SECTION

INTRODUCTION

The Ecology and Environment, Inc., Field Investigation Team (E & E/FIT) was tasked by the Region VII U.S. Environmental Protection Agency (EPA) to conduct a Listing Site Inspection (LSI) of the Big River Mine Tailings site located in Desloge, Missouri.

The 600-acre Big River Mine Tailings site is the result of 30 years (1929 to 1958) of stockpiling lead mining wastes from a mill which was located just west of the Desloge city limits (Novak 1980). After processing, the tailings were transported to the site via a slurry pipeline. Tailings ponds were formed when the tailings settled out. St. Joe Minerals Corporation owned the tailings site until 1972 when it donated the majority of the site, 502 acres, to St. Francois County (Novak 1980). Approximately 100 acres, which is located directly east of the present-day landfill, is still owned by St. Joe Minerals. An immense mine tailings pile, estimated to be 75 to 125 feet high, is located on the St. Joe Minerals property (Hudwalker 1988).

An extensive amount of research and several past investigations have been conducted at the site. This information is detailed in the E & E/FIT Preliminary Assessment (PA) prepared under TDD #F-07-8711-039. The E & E/FIT Data Summary (SI) prepared under Technical Directive Document (TDD) #F-07-8805-008 summarizes analytical results from limited soil sampling. Analysis of samples from the tailings pile reported mean lead concentrations of 2,077 micrograms per gram ($\mu\text{g/g}$), cadmium concentrations of 26 $\mu\text{g/g}$, and zinc concentrations as high as 2,215 $\mu\text{g/g}$. Note: $\mu\text{g/g}$ is essentially equivalent to parts per million (ppm).

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Superfund

The scope of this LSI will include surface water and sediment sampling on the Big River to determine existing conditions of the river. Particulate air sampling is proposed to determine concentrations of airborne lead-bearing dust migrating from the site. Additionally, it is proposed that surface soils be collected from adjacent residential property to evaluate the direct contact threat.

PHYSICAL AND CULTURAL SETTING

The Big River Mine Tailings site is located in St. Francois County approximately one-half mile northwest of Desloge, Missouri (Figure 1). This area of southeast Missouri is known as the "Old Lead Belt" and was formerly a major producer of lead. The coordinates of the approximate center of the site are 37° 53' 11.4" north latitude and 90° 33' 00.0" west longitude (USGS 1982).

The site encompasses approximately 600 acres (Figure 2). It consists mainly of mine tailings ranging from 0 to 100 feet deep (Emergency Action Plan 1981). The majority of the site is situated within a horseshoe meander of the Big River (Figures 1 and 2). A sanitary landfill and landfill office are located on the south end of the site. The landfill is operated by the St. Francois County Environmental Corporation which has a state permit to fill approximately 60 acres (Hudwalker 1988). There are six monitoring wells installed around the landfill (Figure 2). The wells are set at depths ranging from 10 to 48.5 feet and were screened in the tailings.

The Big River Mine Tailings site lies on the eastern side of the Ozark Highland in St. Francois County, Missouri. The major physical features in the area are the St. Francois Mountains to the south, the Farmington Plain to the east, and the dissected topography of the Salem Plateau to the north (USDA 1981). The site is between these major features on the floodplain of the Big River. The basic topography of the site is a rounded hill which slopes on the east, north, and west sides toward the Big River.

The on-site drainage pattern is discussed extensively in the FIT PA Report. The site drains primarily into the Big River along the entire perimeter of the horseshoe bend, where the site abuts the river which forms the site boundary.

The Big River Mine Tailings site is underlain by Precambrian felsites and granites, which are overlain by rock units of the Upper Cambrian series (USDA 1981; MGS 1861). Figure 3 depicts the general stratigraphy of the site vicinity.

The Upper Cambrian Series rock units consist of in ascending order; the Lamotte Formation; the Bonnetterre Formation; and the Elvins Group, which contains the Davis and Derby-Doerun formations. The Elvins Group, and the Potosi and Eminence formations will not be considered in this report because they are topographically higher than the Big River Mine Tailings site (USDA 1981; MGS 1861).

The Lamotte Formation is predominantly a quartzose sandstone that grades laterally in many places into arkose and conglomerate (MGS 1861). The formation is approximately 300 feet thick in the study area (Buckley 1908). The Lamotte aquifer is a regional drinking water source (MGS 1983).

The Bonnetterre Formation is typically a light-gray, medium to fine-grained, medium-bedded dolomite, although it consists of relatively pure limestone in some areas (MGS 1861). The formation is approximately 350 feet thick in the study area. This formation is the principal source for lead mining in the area that occurred in the late 19th and early to mid-20th centuries. The Bonnetterre aquifer is also a regional drinking water source (MGS 1983).

The area ground water aquifers that are topographically lower than the site are the Bonnetterre and Lamotte formations. The Flat River Water District serves the towns of Desloge, Elvins, Flat River, Leadington, River Mines, and Ester, Missouri. The approximate population served is 12,000 (Johnson 1987). The Big River Mine Tailings site is adjacent to the town of Desloge and is within 2 miles of Flat River. The Flat River Water District's water supply comes from the Bonnetterre Formation, via a sealed, abandoned mine shaft located approximately 2 miles south of the site in River Mines, Missouri; and from the Lamotte Formation, via a well in Desloge approximately 3,000 feet east of the site, that is pumped from 410 feet deep (Johnson 1987).

The typical ground water flow in the site area is toward the river. Several natural springs in the site vicinity flow into the Big River (Burris 1988). When the river is at flood stage, ground water may not flow toward the river, though this situation is unusual.

PROPOSED FIELD ACTIVITIES

Nine composite sediment samples, 10 surface water samples, 7 ground water samples, 10 tailings samples, 6 surface soil samples, and 40 air samples are proposed to be collected during this investigation (Table 1). Field activities are scheduled to begin July 23, 1990, and samples are scheduled to be delivered to the EPA Region VII Laboratory on July 30, 1990. Sample series CSXCR will be assigned to this activity. All sampling will be conducted in accordance with the Region VII E & E/FIT Quality Assurance Project Plan (E & E/FIT 1989).

All samples will be submitted for total metals analyses. Water samples also will be analyzed for dissolved metals. The pH, temperature, and conductivity of all water samples will be measured and recorded in the field.

Sediment and Surface Water Samples

Ten surface water samples, including one duplicate and one trip blank, will be collected with corresponding composite sediment samples (0 to 2 inches deep). Surface water samples will be collected first, to avoid introducing disturbed sediment into the water samples. The composite sediment samples will consist of five aliquots, one collected every 5 feet over a 25-foot linear distance.

Three upgradient locations will be sampled to establish an average background concentration. The remaining five locations will be situated at various locations along the river meander that encompasses the tailings pile, and from locations downgradient of the tailings pile. A duplicate sample will be collected for each matrix. A water trip blank will be transported to the field, labeled, preserved, and submitted for total metals analysis. Additionally, one field blank will be prepared on site and submitted for total and dissolved metals analysis. Approximate sample locations are depicted on Figure 2; the locations are subject to change based on accessibility.

Soil and Tailings Samples

Ten composite tailings samples, including one duplicate, will be collected from the Big River tailings pile to characterize the metals concentrations. These samples will be collected from 0 to 6 inches deep at random locations over the pile and will consist of five aliquots, one collected every 5 feet over a 25-foot linear distance. See Figure 2 for approximate sample locations.

Three surface soil samples will be collected at 0 to 6 inches deep from residential properties adjacent to the Big River tailings pile. Three background surface soil samples will be collected east of the tailings pile to establish background metals concentrations. See Figure 2 for approximate surface soil and tailings sample locations. These locations are subject to change based on accessibility.

Air Samples

Eight high-volume (hi-vol) air samplers will be placed around the tailings area to collect suspended particulates for trace metals analysis (Figure 2). These samplers will be equipped with Whatman #4 cellulose filters measuring 8 1/2 x 11 inches. The metals of primary concern are airborne lead, zinc, and cadmium. The hi-vol locations will be selected based on historical wind data for the months of July and August obtained from the nearest airport. The downgradient hi-vol samplers will be placed around the site, approximately 20 feet away from the site boundary. The background hi-vol will be located sufficiently away from the site in an upwind direction to avoid any effects of blowing particulates from the site. Six sampling stations will be set up, with two hi-vol samplers in one location, providing duplicate samples for data analysis quality assurance. The hi-vol samples will be placed 4 to 6 feet above the ground surface to characterize air quality in the breathing zone.

A meteorological station will also be placed near the site. The station will collect air temperature, relative humidity, barometric pressure, and wind speed and direction continuously during the sampling period. A wind rose will be constructed during each sampling period to determine the primary wind direction, the upwind (background), and downwind locations.

Generators will be used to power the hi-vol samples, which will limit the maximum sample period to 12 hours. A non-parametric analysis will be used to compare upwind and downwind samples; this will require

five duplicates at each sample station. Samples, therefore, will be collected over a 12-hour period each day for five consecutive days. The air sampling procedures will be performed according to Standard Operating Procedure FA113C, Monitoring for Particulate and Vapor Phase Pollutants Using the General Metals PS-1, Portable Particulate/Vapor Air Sampler.

A total of 40 air samples will be collected (Figure 2). The samples will be submitted to the EPA Region VII Laboratory for total metals analysis.

Ground Water Samples

Seven ground water samples, including one duplicate, will be collected from the six monitoring wells around the landfill. Three volumes of water will be purged from each well before sampling. The samples will be collected with PVC bailers after allowing recharge time. The ground water sampled in these wells represents an artificial aquifer created by the large tailings pile. For detailed information concerning the monitoring well construction and depths, refer to the E & E/FIT PA.

Personnel and Resource Requirements

It is anticipated that a four-person team will require five days to complete the sediment, surface water, and soil/tailings sampling. Additionally, a three-person team will require seven days to complete the air sampling. Estimated hours for the field activities are 754. The field activities are tentatively scheduled to begin on July 23, 1990. High priority fast turn-around time is requested for analysis.

A mini-ram particle counter will be used to monitor the total suspended particulates on site. All sampling is expected to be conducted in level D personal protection. Level C will be available if wind conditions and the particle counter warrant an upgrade to prevent inhalation of and direct contact with contaminated airborne particulates.

Non-expendable equipment will be decontaminated with alconox and water wash followed by a tap water rinse and a final deionized water rinse. Disposable equipment will be double-bagged and returned to the EPA Region VII Laboratory for final disposal.

SUMMARY

The LSI of the Big River Mine Tailings pile is being conducted to characterize existing site conditions and evaluate possible off-site hazards, including contamination of the air and river. The LSI will include the collection of 10 tailings samples, 7 ground water samples, 10 surface water samples (including a blank), 9 sediment samples, 6 surface soil samples, and 40 air samples. The field work is tentatively scheduled for the week of July 23, 1990. All samples will be submitted to the EPA Region VII Laboratory on July 30, 1990, for high priority total metals analysis. A trip report will be submitted within four weeks after completion of field work.

Attachments: Bibliography
Figure 1: Site Location Map

Figure 2: Site Map Illustrating Sample Locations
Figure 3: General Stratigraphy
Table 1: Proposed Sample Summary
Analytical Services Request Form

Table 1
Proposed Sample Summary
Big River Mine Tailings Site
Desloge, Missouri
E & E/FIT; May 1990
Sample Series CSXCR

Number	Matrix	Sample Container/Sample
6	Soil	1 8-oz glass jar
10	Tailings	1 8-oz glass jar
9	Sediment	1 8-oz glass jar
10	Surface Water	2 1-liter cubitainers
7	Ground Water	2 1-liter cubitainers
1	Trip Blank (water)	1 1-liter cubitainers
1	Field Blank (water)	2 1-liter cubitainers
40	Air	1 filter

Note: All samples will be submitted to the EPA Region VII Laboratory for total metal analysis on July 30, 1990. Water samples will also be analyzed for dissolved metals. See Figure 2 for approximate sample locations. Rapid analysis of the samples is requested.

BIBLIOGRAPHY

Burris, James, February 1, 1988, personal communication, Director, Missouri Department Natural Resource Poplar Bluff Office, Poplar Bluff, Missouri.

Buckley, E.R., 1908, Geology of the Disseminated Lead Deposits of St. Francois and Washington Counties: Missouri's Bureau of Geology and Mines, 2nd Series, Vol. 8, PA. 1

Emergency Action Plan for Lead Mine Tailings, Desloge, Missouri, Draft, 1981.

Hudwalker, Marvin, February 2, 1988, Professional Engineer, Hudwalker and Associates, Inc., Farmington, Missouri, personal communication with Bob Overfelt, E & E/FIT.

Johnson, Dennis, December 2, 1987, Assistant Manager Water District Flat River, Missouri, Telephone conversation with Bob Overfelt, E & E/FIT.

Missouri Division of Geological Survey and Water Resources, 1861, The Stratigraphic Succession in Missouri.

Missouri Division of Geological Survey and Water Resources, 1983, Ground Water Maps of Missouri.

Novak, John, and Gerard Hasselwander, January 1980, Control of Mine Tailings Discharges to Big River, Department of Civil Engineering, University of Missouri-Columbia.

U.S. Department of Agriculture, Soil Survey of St. Francois County, Missouri, August 1981, National Cooperative Soil Survey.

U.S. Geologic Survey, 1982, Bonne Terre Quadrangle Missouri 7.5 Minute Series (Topographic).

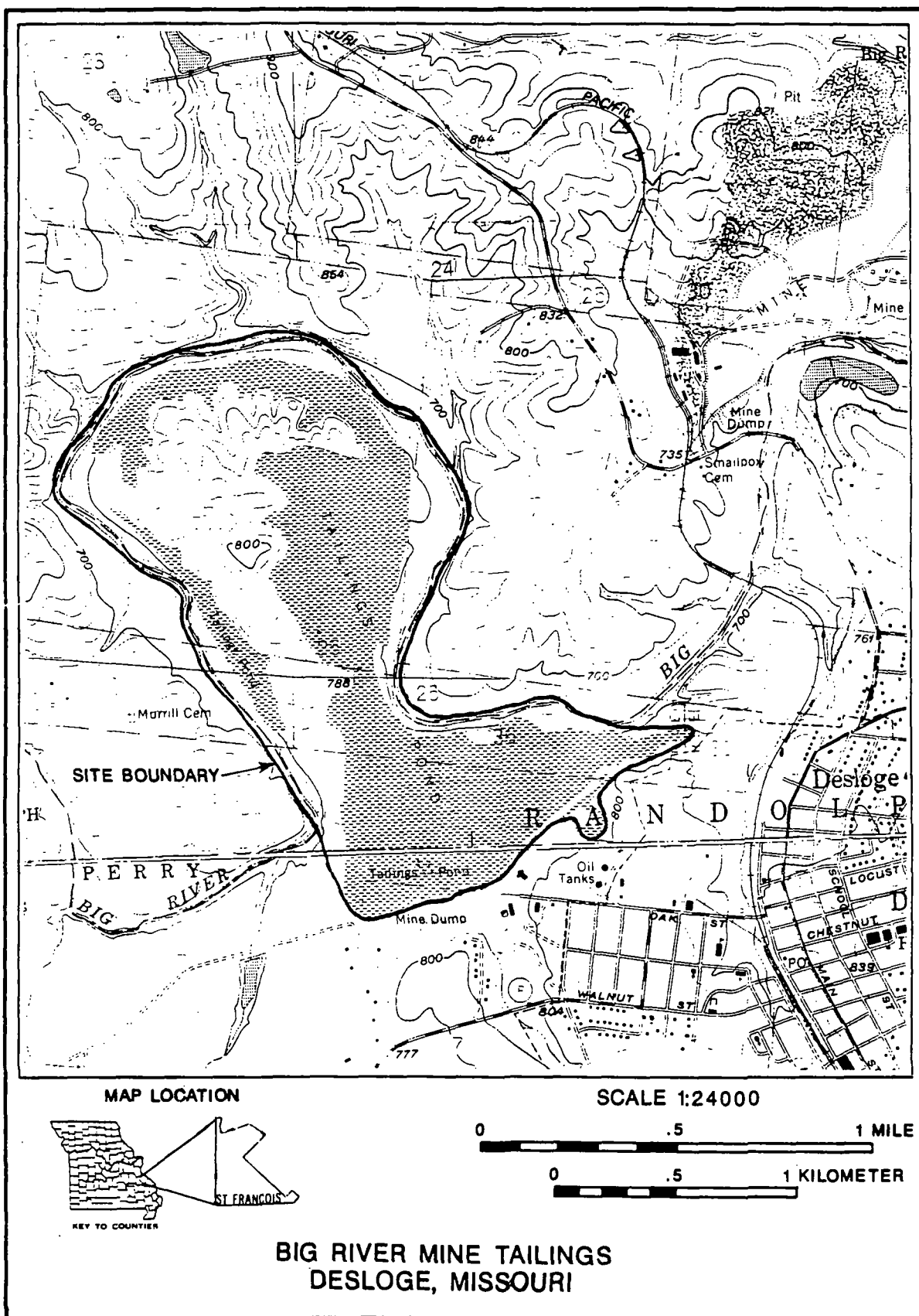
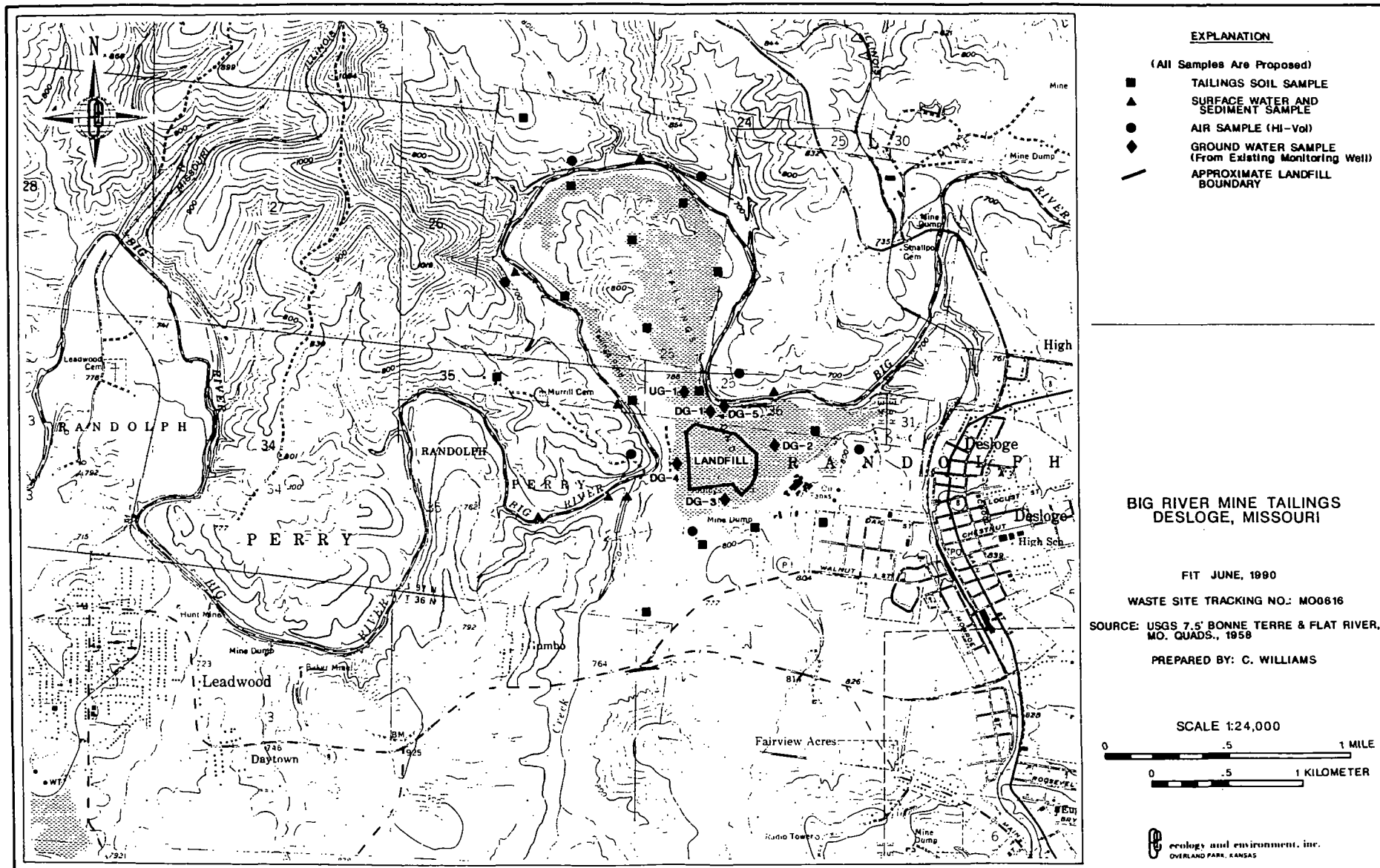
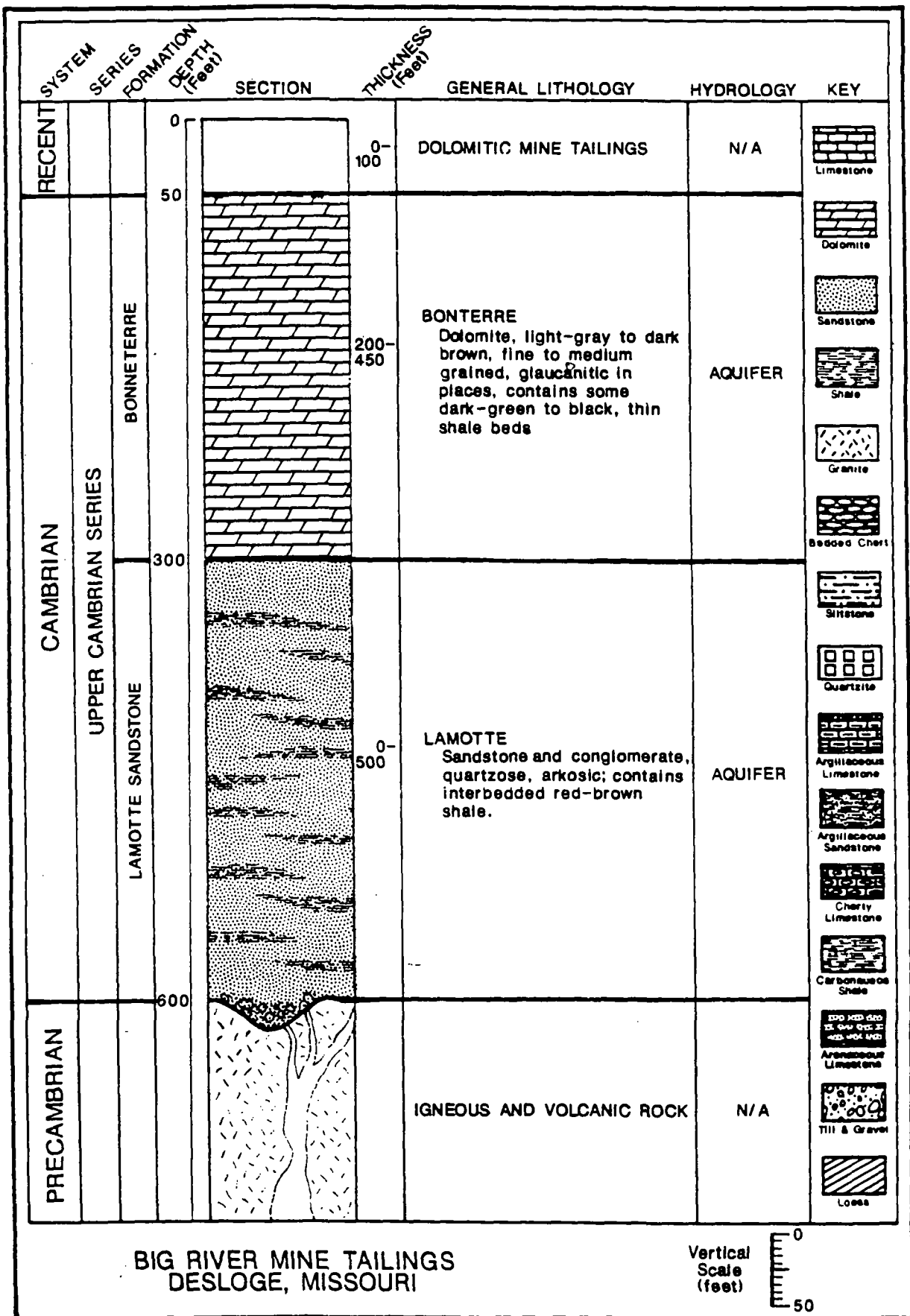


FIGURE 1 : SITE LOCATION





WASTE SITE TRACKING NO.: MO0616
PREPARED BY: C. WILLIAMS

ECOLOGY & ENVIRONMENT FIT APRIL 1988

FIGURE 3: GENERALIZED STRATAGRAPHIC COLUMN

US EPA REGION VII ANALYTICAL SERVICES REQUEST FORM

Activity Number: CSXCR Date: 5/29/90
 Site Name & Location: Big River Mine Tailings Site Desloge MO.
 EPA Contact: Greg Reeser / Pete Culver Section/Branch: Superfund
 Task Leader: Steven Vaughn ISOE/FFT Phone Number: 551-7695
 Contractor: Ann Melia ERIE/FFT Phone Number: 432-9961
 Projected Sample Delivery Date: July 30, 1990
 Sampling Objective: LSI

REQUEST SUMMARY

No. of Samples	MGP Code	Matrix	Parameters
16		Sail/Tailings	Total metals
9		Sediment	Total metals
16 17 including 1 field + 1 trip blank		Water	Total + Dissolved metals
40		Air	Total metals

SPECIAL REQUIREMENTS OR COMMENTS

Trip Blank & Field Blank required for pick-up July 20, 1990. High priority analysis requested.

APPROVALS:

Originator

Division Director or Branch Chief

DATA REVIEW OPTIONS:

☐ In-Depth: Must be justified.

☒ Limited: Normal

☐ No Review: Must be justified.

NOTE: SUBMIT TO RQAO/ENSV 30 DAYS PRIOR TO SAMPLE DELIVERY DATE

FOLLOWING TO BE COMPLETED BY ENVIRONMENTAL SERVICES DIVISION ONLY

Concurrences:

RQAO _____ ☐ Generic ☐ Site Specific ☐ Other

LABO _____ Comment: _____

Lab Assignment: _____ Scheduled Completion: _____

☐ Region VII _____
☐ CLP _____
☐ ESAT _____
☐ Other: _____
☐ Other: _____
☐ Routine (In house: 4 wks) (CLP: 8 weeks)
☐ Other: _____
 Date: _____

Distribution:

<input type="checkbox"/> EPA Contact	<input type="checkbox"/> ESWM
<input type="checkbox"/> Chief, LABO	<input type="checkbox"/> EMCM
<input type="checkbox"/> Chief, GNAN	<input type="checkbox"/> EP&R
<input type="checkbox"/> Chief, ORGN	<input type="checkbox"/> ESAT
<input type="checkbox"/> Chief, CLPM	<input type="checkbox"/> Other: _____
<input type="checkbox"/> Data Coord.	
<input type="checkbox"/> RSCC	